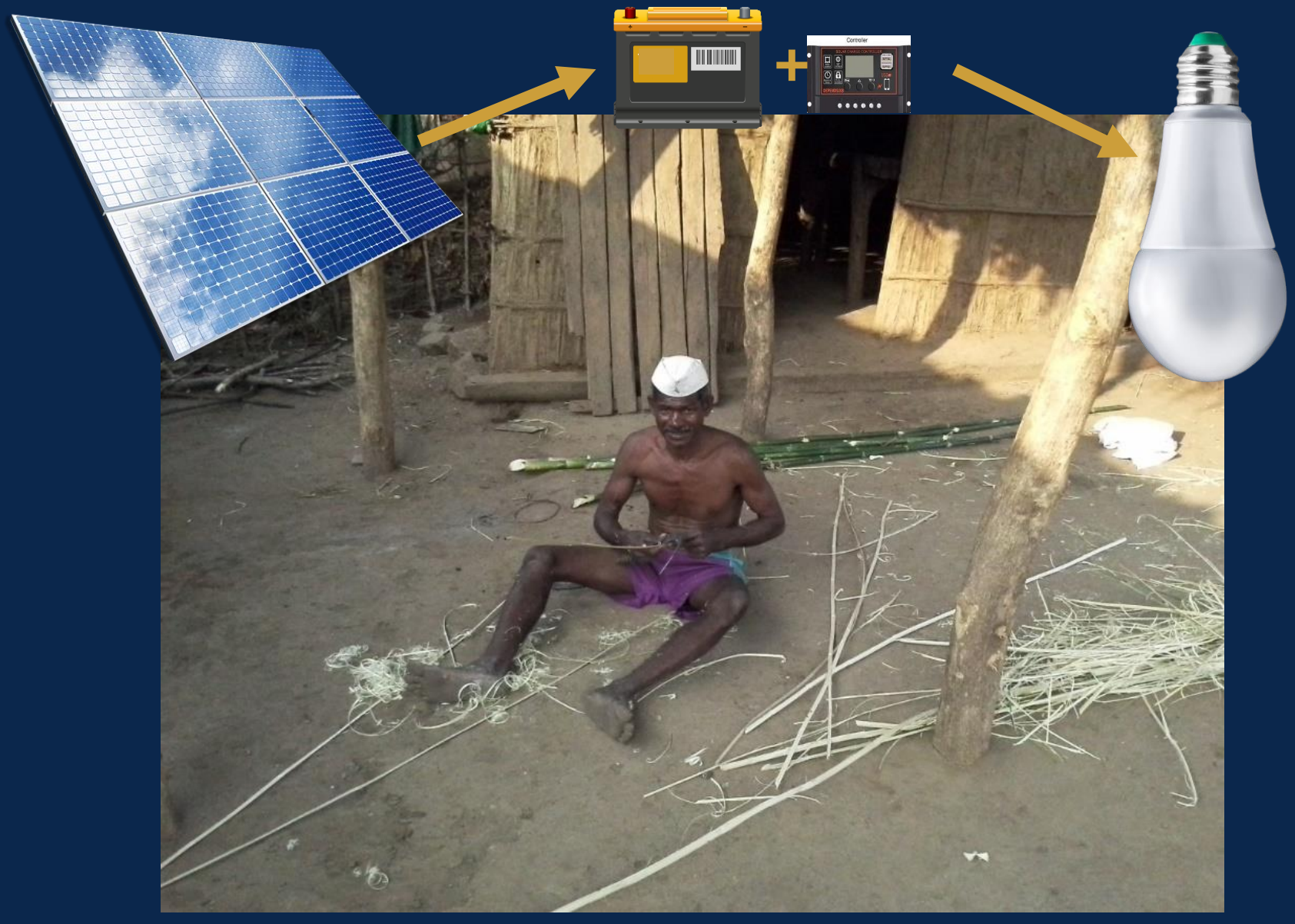
# Low Voltage Direct Current

## An international and inclusive approach

Vimal Mahendru
IEC Ambassador, Chair Systems Committee LVDC
Busan, October 24, 2018

IEC
International Electrotechnical Commission

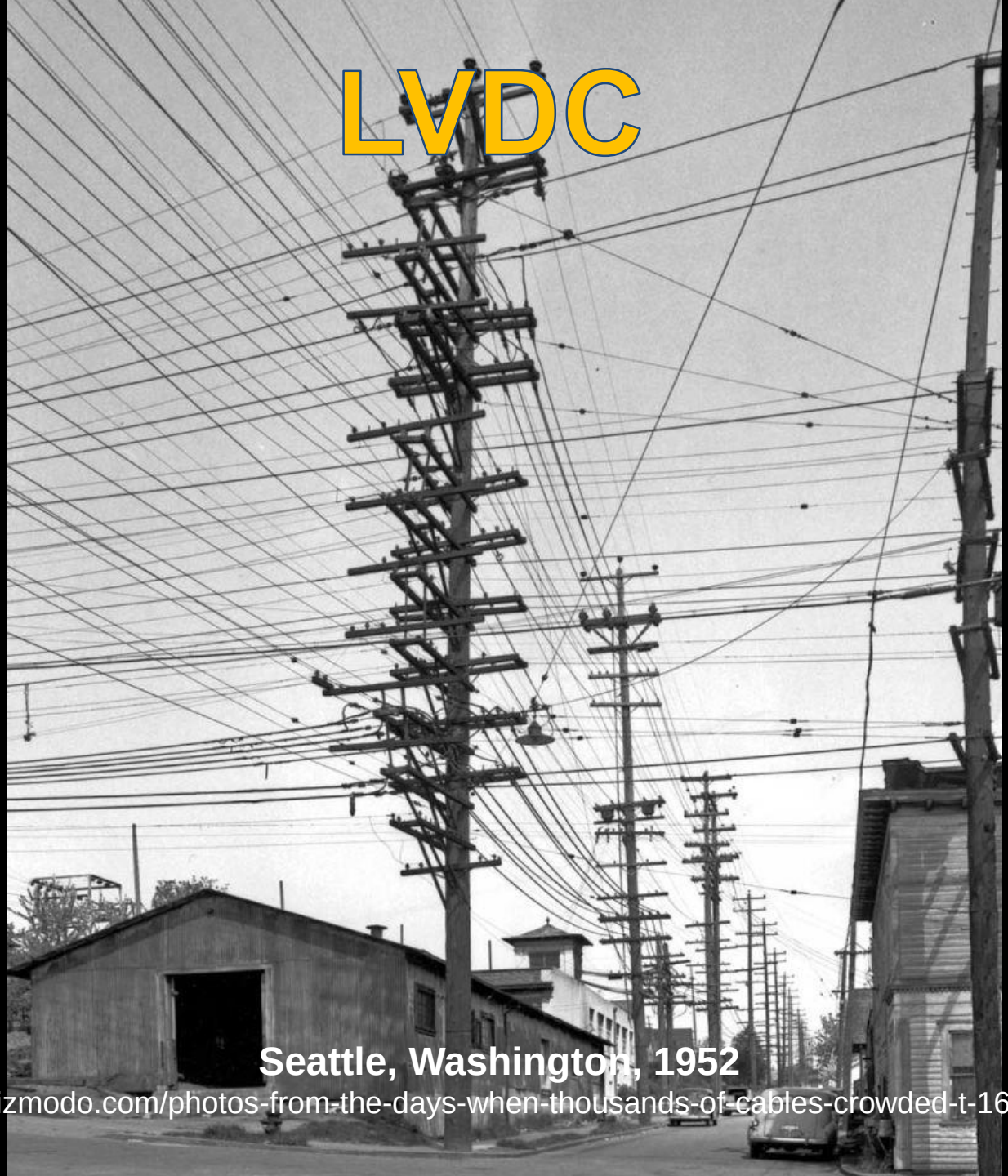

Controller

# LVDC

**New York, 1887**

http://io9.gizmodo.com/photos-from-the-days-when-thousands-of-cables-crowded-t-1629961917

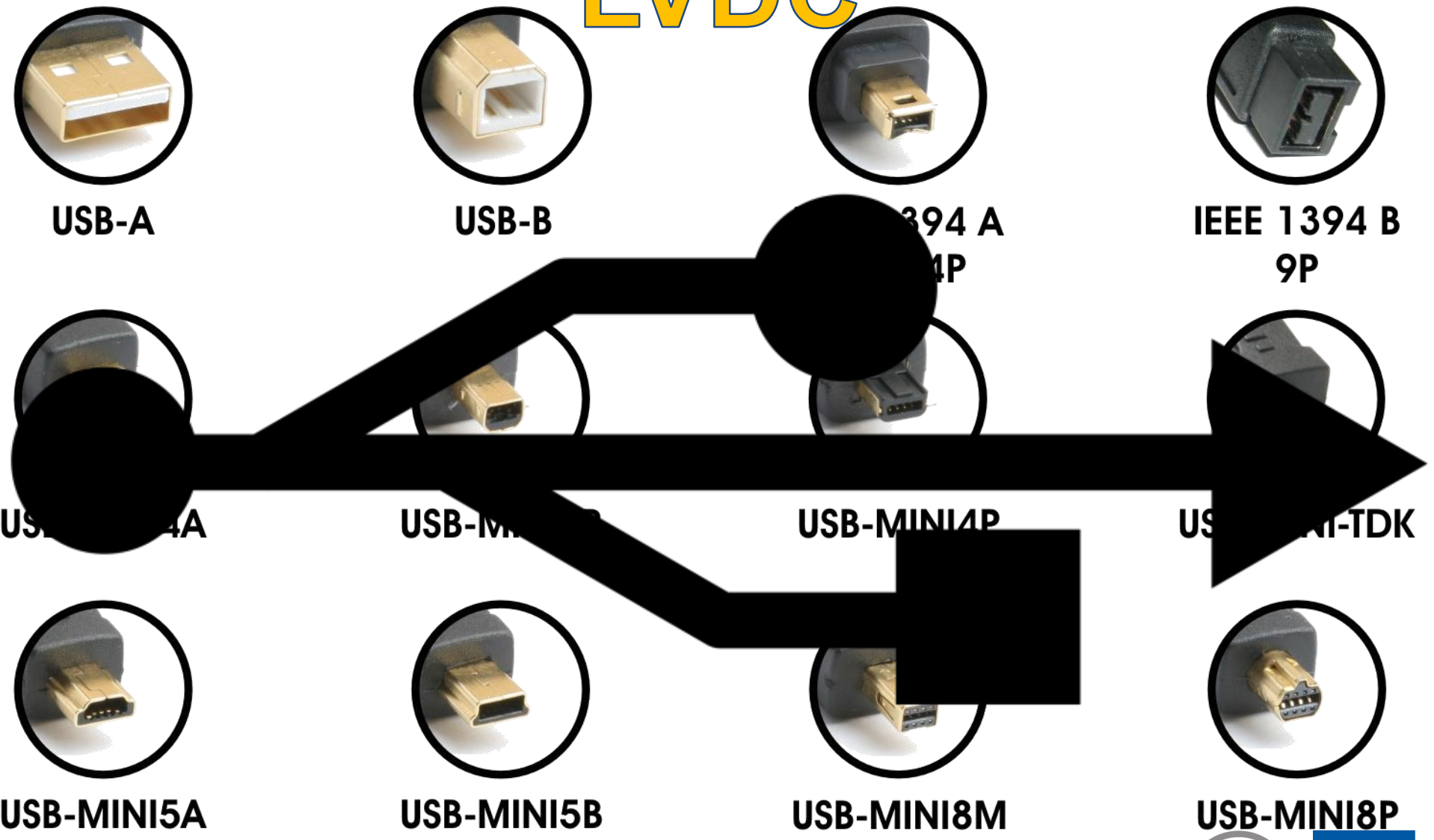
# LVDC



**Seattle, Washington, 1952**

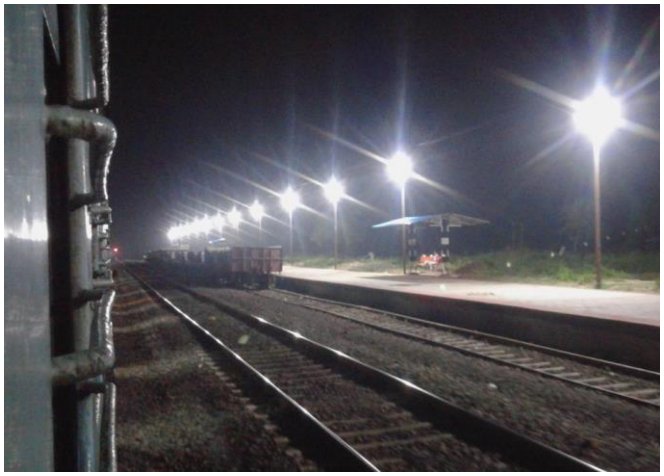
http://io9.gizmodo.com/photos-from-the-days-when-thousands-of-cables-crowded-t-1629961917

# LVDC


USB-A
USB-B
394 A
4P
IEEE 1394 B
9P
4A
USB-M
USB-MINI4P
NI-TDK
USB-MINI5A
USB-MINI5B
USB-MINI8M
USB-MINI8P

# All the things we ❤ and 👍 run on Direct Current

# DC Data Centers



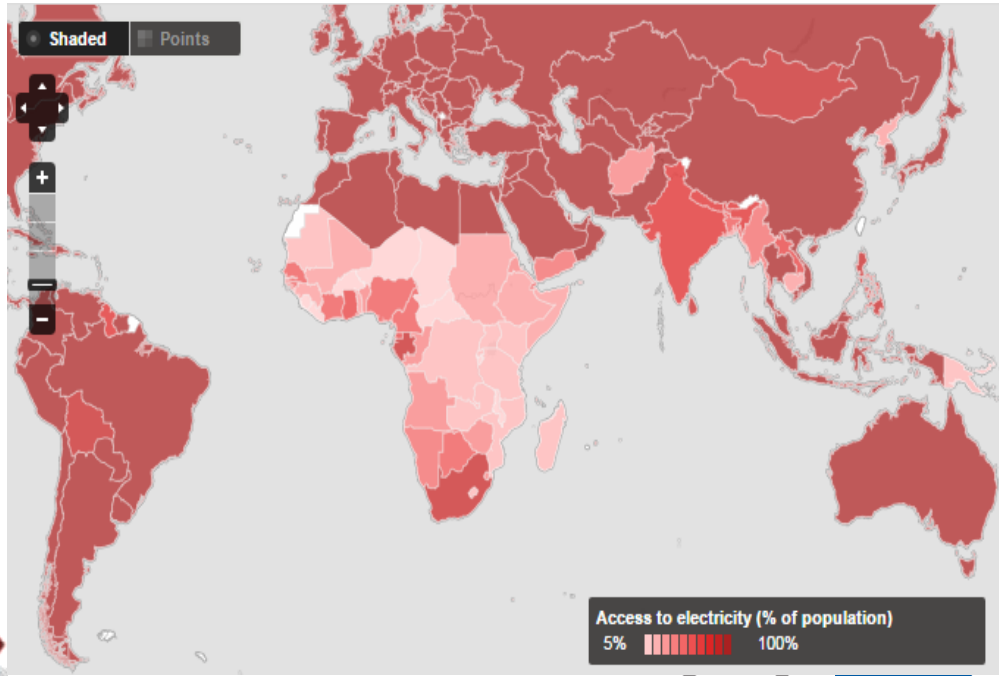
# Public Installations

# Electromobility: revolution in motion

# Two main market drivers

**Energy Efficiency** in Developed Economies

**Electricity Access** in Developing Economies




Images adapted from www.cleanenergynews.co.uk

1 in 5 has no access to electricity

1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
7 AFFORDABLE AND CLEAN ENERGY
6 CLEAN WATER AND SANITATION
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
17 PARTNERSHIPS FOR THE GOALS
IEC

# Measuring energy access: the multi-tiers

World Bank Multitier Framework for Energy Access
(https://www.esmap.org/node/55526)

Photo adapted from https://www.esmap.org/node/55526

IEC

WORLD BANK GROUP

# LVDC off-grid for rural Healthcare

- UNDP estimates this to be biggest demand outside of electricity for rural homes,

Picture courtesy UNDP

# Rural Solar Water Pumping

# Why a Systems Approach?

## A phone years ago…

**…you could just make calls with it!**

## A phone today

Music, photos, video, GPS, Internet…
2G, 3G, 4G, WIFI, Bluetooth, NFC…
Touch screen, battery, USB, HDMI…
Accelerometer, gyroscope, proximity senso

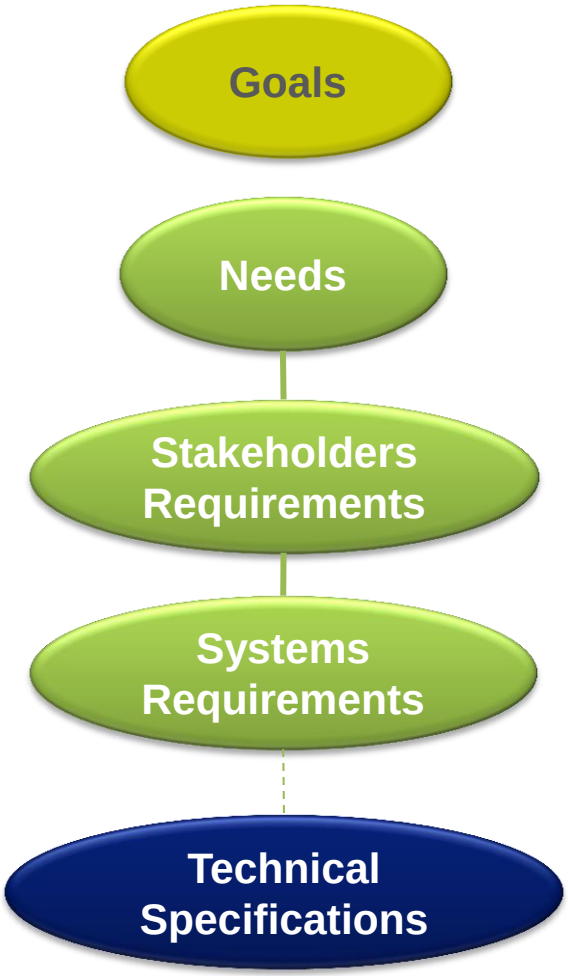
**… and you can still make a call with it!**

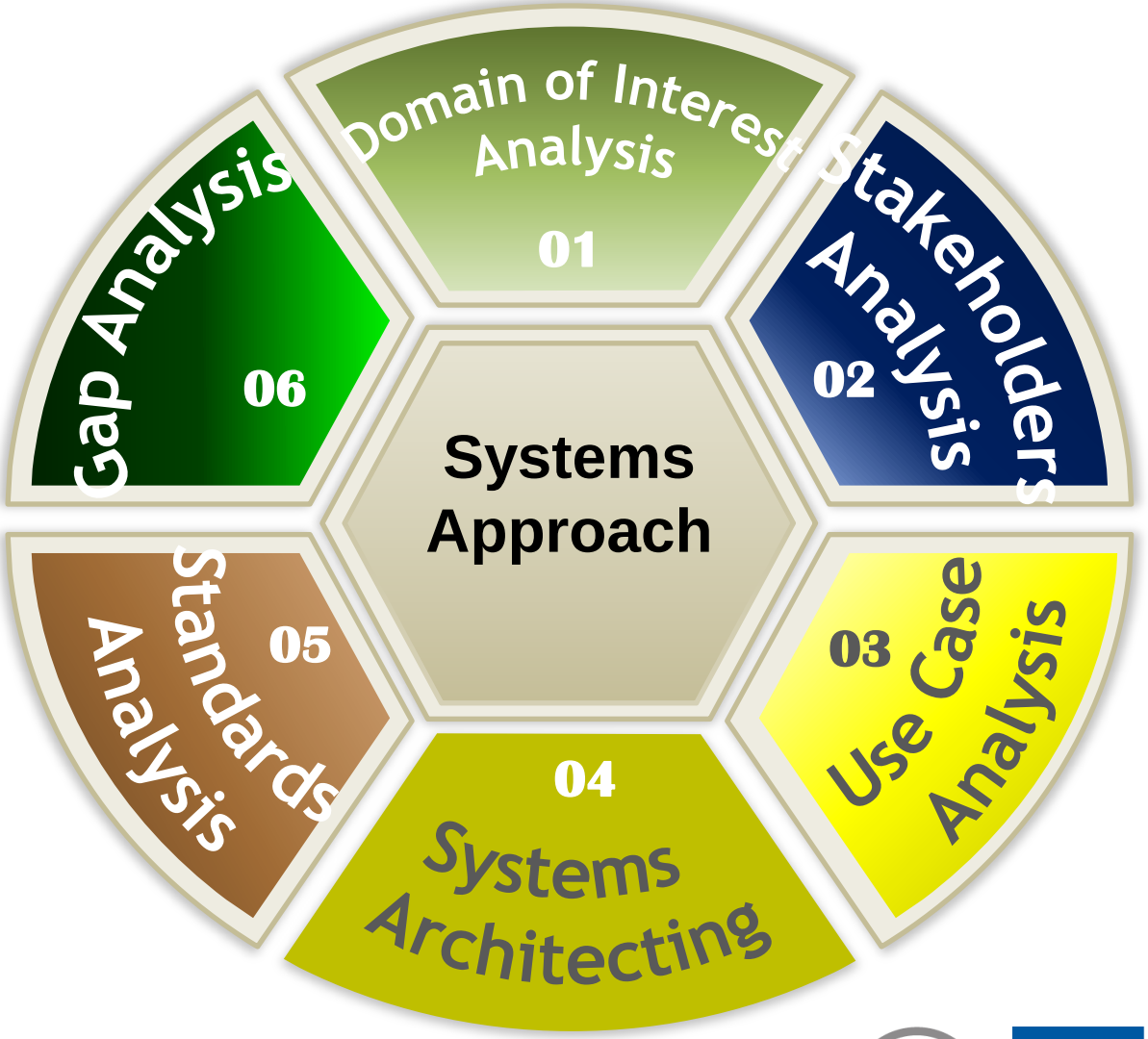
## An ever increasing number of technologies and standards are involved

# A (man-made) Systems is…

**Which property emerges from the System?**

# The Methodology*




*There is no one-size-fits-all approach*

# For more LVDC Info

- IEC LVDC Zone (www.iec.ch/LVDC)
  - includes content from past conferences
  - downloads area (brochures, mnemonic, public content)
- Open Forum - LVDC
- SyC LVDC LinkedIn Group
- The LVDC Technology Paper:
  LVDC: electricity for the 21st century
- LVDC Videos
  - TEDx on LVDC https://goo.gl/HjXTuN
  - UN SDG7 Video https://goo.gl/s6VEvz

# Get involved,
# Make a difference

# Thank you!

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